# Average reachability of continuous-time Markov jump linear systems and linear Markovian state observers

Narvaez Alfredo, Roa Rafael, Costa, Eduardo Fontour.

## Abstract

Stability of state estimators for Markov jump linear systems featuring time-varying and correlated noise processes are studied in this paper. Three conditions for stability are presented, starting with a more general one requiring positiveness of the covariance of the error estimate, and is applicable to a class of filters that contains the well known linear minimum mean square estimators. It is then derived a more strict condition based on the plant parameters only, which may be interpreted as requiring that the state additive noise pervades every system dynamics. Finally, we consider a structural notion linked with the reachability gramian and we show it is a sufficient condition for the previous ones to be fulfilled, thus linking the filter stability with the structure of the plant, and present a simple rank test. Illustrative examples are included.

## keywords

Additive noise, Linear systems, Markov processes, State estimation